

Amdt. After Final Dated: February 19, 2003
Reply to Office Action of January 26, 2003

Docket No. 500024-19 (TECON-66072)
TECHCON.001A

Listing of Claims:

1. (previously amended) A method of receiving a wireless transmission comprising the steps of:

inverting the polarity of an incoming waveform corresponding to said wireless transmission on every one half clock cycle of a conversion clock having a predetermined frequency to produce a commutated waveform, thereby translating said incoming waveform downward in frequency; and

converting said commutated waveform to a series of representative digital values using a delta-sigma modulator clocked by said conversion clock operating at said predetermined frequency.

2. (original) The method of claim 1, wherein said incoming waveform is centered about a radio frequency and carries a modulated signal, wherein said conversion clock has a frequency approximately equal to said radio frequency, and said series of representative digital values are representative of said modulated signal.

3. (original) The method of claim 2, further comprising the step of digitally filtering said series of representative digital values according to programmable filter characteristics wherein said programmable filter characteristics are selected based upon a type of modulation of said modulated signal.

4. (previously amended) The method of claim 1, wherein said step of inverting comprises the steps of:

producing an inverted signal representation of said incoming waveform;

producing a non-inverted signal representation of said incoming waveform;

coupling said inverted signal representation to a first input port of a switch;

coupling said non-inverted signal representation to a second input port of said switch; and

coupling said conversion clock to a control port of said switch.

5. (original) The method of claim 1, wherein said incoming waveform is received over an antenna and wherein an amplitude of said incoming waveform is in fixed proportion to an amplitude of a signal strength received by said antenna.

6. (original) The method of claim 1, further comprising the step of filtering an antenna signal to prevent aliasing out-of-band signal and noise power into a desired signal band,

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said step of filtering producing said incoming waveform, and wherein a frequency of said conversion clock is selected from a range of frequencies passed in said step of filtering.

7. (previously amended) A circuit employed in a receiver comprising:

a continuous time commutator configured to be coupled to a digital conversion clock and configured to invert the polarity of an incoming communication signal applied to an input port on every half clock cycle of said digital conversion clock having a predetermined frequency and to produce a commutated signal at an output port, thereby translating said incoming signal downward in frequency; and

a delta-sigma modulator having a clock input port coupled to said digital conversion clock operating at said predetermined frequency, having a signal input port coupled to said output port of said continuous time commutator and having an output port configured to produce a series of digital values representative of a modulation waveform carried by said incoming signal.

8. (previously amended) The circuit employed in the receiver of Claim 7, wherein said continuous time commutator comprises:

a complementary amplifier configured to receive said incoming signal and to produce an inverted version of said incoming signal at an inverted output port and to produce a non-inverted version of said incoming signal at a non-inverted output port; and

a switch having a first input port coupled to said inverted output port, having a second input port coupled to said non-inverted output port and having a control port coupled to said digital conversion clock.

9. (previously amended) The circuit employed in the receiver of Claim 7, wherein said delta-sigma modulator comprises:

a loop amplifier having a first input port coupled to said output port of said continuous time modulator, having a second input, and having an output port;

a continuous time loop filter coupled to said output port of said loop amplifier and having an output port;

an edge-triggered comparator coupled to said output port of continuous time loop filter, having a clock input coupled to said digital conversion clock and having an output port; and

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a one-bit digital to analog converter having an input port coupled to said output port of said edge-triggered comparator and having an output port coupled to said second input of said loop amplifier.

10. (previously amended) The circuit employed in the receiver of claim 7, further comprising a programmable digital filter having an input port coupled to said output of said delta-sigma modulator, said programmable digital filter configured to filter said series of digital values according a filter characteristics selected based upon a type of modulation of said modulation waveform.

11. (previously amended) The circuit employed in the receiver of claim 7, further comprising an antenna coupled to said continuous time commutator so as to receive said incoming signal, wherein an amplitude of said incoming signal is in fixed proportion to an amplitude of a signal strength received by said antenna.

12. (previously amended) The circuit employed in the receiver of claim 7, further comprising a filter configured to receive an antenna signal and configured to prevent aliasing of out-of-band signal and noise power into a desired signal band, said filter coupled to said input port of said continuous time commutator, wherein a frequency of said conversion clock is selected from a range of frequencies passed by said filter.

13. (canceled)

14. (previously amended) An apparatus for receiving a wireless transmission comprising:

means for inverting the polarity of an incoming waveform representative of said wireless transmission on every one half clock cycle of a conversion clock having a predetermined frequency to produce a commutated waveform, thereby translating said incoming waveform downward in frequency; and

means for converting said commutated waveform to a series of representative digital values using a delta-sigma modulator clocked by said conversion clock operating at said predetermined frequency.

15. (original) The apparatus of claim 14, wherein said incoming waveform is centered about a radio frequency and carries a modulated signal, wherein said conversion clock has a frequency approximately equal to said radio frequency, and said series of representative digital values are representative of said modulated signal.

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16. (original) The apparatus of claim 15 further comprising means for digitally filtering said series of representative digital values according to programmable filter characteristics wherein said programmable filter characteristics are selected based upon a type of modulation of said modulated signal.

17. (previously amended) The apparatus of claim 14, wherein said means for inverting comprises:

means for producing an inverted signal representation of said incoming waveform;
means for producing a non-inverted signal representation of said incoming waveform;
means for coupling said inverted signal representation to a first input port of a switch;
means for coupling said non-inverted signal representation to a second input port of said switch; and

means for coupling said conversion clock to a control port of said switch.

18. (original) The apparatus of claim 14, wherein said incoming waveform is received over an antenna and wherein an amplitude of said incoming waveform is in fixed proportion to an amplitude of a signal strength received by said antenna.

19. (original) The apparatus of claim 14, further comprising means for filtering an antenna signal to prevent aliasing out-of-band signal and noise power into a desired signal band, said means for filtering producing said incoming waveform, and wherein a frequency of said conversion clock is selected from a range of frequencies passed in said means for filtering.

20. (canceled)

21. (canceled)

22. (canceled)

23. (currently rewritten in independent form) A method of receiving a wireless transmission comprising:

multiplying an incoming waveform by +1 and -1 on alternating half cycles of a conversion clock to produce a commutated waveform, thereby translating the incoming waveform downward in frequency;

wherein the incoming waveform comprises a baseband frequency signal modulated at a carrier frequency, and the conversion clock has a frequency of approximately the carrier frequency;

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whereby the multiplying step produces a signal of approximately the baseband frequency;
and

wherein the incoming waveform has a frequency of greater than 1 MHz, and the multiplying and converting steps downconvert the incoming signal directly to a baseband frequency without needing to first downconverting the incoming signal to an intermediate frequency.